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DIVISION OF AIR QUALITY

DEPARTMENT OF THE AIR FORCE
75TH CIVIL ENGINEER GROUP (AFMC)
HILL AIR FORCE BASE UTAH

25 April 2017

Michelle L. Cottle
Chief, Environmental Branch
75th CEG/CEIE
7290 Weiner Street
Hill Air Force Base Utah 84056-5003

Document Date: 04/25/2017
DAQ-2017-005326

Mr. Marty D. Gray
Manager – New Source Review Section
Utah Division of Air Quality
P.O. Box 144820
Salt Lake City Utah 84114-4820

Dear Mr. Gray

Hill Air Force Base (AFB) is pleased to submit a Best Available Control Measures (BACM) analysis for control of particulate matter less than or equal to 2.5 microns in aerodynamic diameter ($PM_{2.5}$) and its precursors for significant sources at the installation. This submittal is in response to the letter issued by the Division regarding the new State Implementation Plan (SIP) control strategy requirements resulting from the designation of the $PM_{2.5}$ nonattainment area from moderate to serious, dated January 23, 2017. Per the letter request and direction from the Division's permitting engineer assigned to Hill AFB, Mr. Tad Anderson, all sources were grouped by source category and reviewed for possible new control technologies and best management practices. The results are documented in the attached submittal.

At the request of Mr. Anderson, a detailed analysis per emission unit for all grandfathered and active boilers not subject to New Source Performance Standards (NSPS) are provided in the attached report. The boilers analyzed for BACM include all grandfathered boilers, boilers not subject to NSPS requirements with heat input greater than 20 MMBTU/hr, active boilers subject to NSPS, and select boilers less than 20 MMBTU/hr with the highest usage over the past five years. The boilers included in the analysis provide the greatest potential for emissions reductions within the source category while also providing a representative cross section of all boilers at the facility.

The attached provides a current analysis of all source categories, as well as all historical BACM determinations approved by the Division's New Source Review Section. Based on the analysis, the existing emission limits and monitoring requirements identified in Tables 2-5 and 5-1 of the attached report and those contained within Title V Operating Permit #1100007003 represent BACM and provide an appropriate means for compliance demonstration. If you have

any questions or would like to discuss this issue further, my point of contact is Dr. Erik Dettenmaier 75 CEG/CEIEA, at (801) 777-0888 or erik.dettenmaier.1@us.af.mil.

Sincerely

For

MICHELLE L. COTTLE, NH-03
Chief, Environmental Branch
75th Civil Engineer Group

One Attachment:
1. BACM Analysis

Hill Air Force Base, Utah

Final

Best Available Control Measures Analysis

April 2017

FINAL

Hill Air Force Base

Best Available Control Measures Analysis

Prepared for

Hill Air Force Base
75 CEG/CEIEA
Environmental Management Division
Civil Engineer Group

April 2017

4246 South Riverboat Road, Suite 210
Taylorsville, UT 84123

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Acronyms and Abbreviations

AFB	Air Force Base
AFI	Air Force Instruction
BACM	Best Available Control Measures
BACT	Best Available Control Technology
CARB	California Air Resources Board
DOD	Department of Defense
EPA	Environmental Protection Agency
EPU	Emergency Power Unit
HEPA	High Efficiency Particulate Arrestor
LAER	Lowest Achievable Emission Rate
LNB	Low NOx Burner
NESHAP	National Emission Standard for Hazardous Air Pollutant
NH_3	Ammonia
NOx	Oxides of Nitrogen
NSPS	New Source Performance Standards
NSR	New Source Review
$PM_{2.5}$	Particulate Matter Less Than 2.5 Microns in Aerodynamic Diameter
RACT	Reasonably Achievable Control Technology
RBLC	RACT/BACT/LAER Clearinghouse
SCAQMD	South Coast Air Quality Management District
SO_2	Sulfur Dioxide
UDAQ	Utah Division of Air Quality
VOC	Volatile Organic Compounds
WIWMD	Wasatch Integrated Waste Management District

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SECTION 1

Purpose

Due to the serious nonattainment area designation by the United States Environmental Protection Agency (EPA), all major sources of particulate matter less than or equal to 2.5 micron ($PM_{2.5}$) and precursors within the nonattainment area are required to meet best available control technology (BACT) or best available control measures (BACM) requirements. This document provides a detailed top down BACT analysis of grouped emission units by source category, an emission unit specific analysis for the external combustion source category, and an analysis and comprehensive summary of BACT for all recent permitting actions of all significant emission units at Hill Air Force Base (AFB). The analysis was conducted for and in accordance with the request of the State of Utah Division of Air Quality (UDAQ), detailed in a letter dated January 23, 2017.

1.1 Background

Hill AFB, Main Base is located about 30 miles north of Salt Lake City, UT and comprises 6,600 acres including the Little Mountain facility located 18 miles northwest of the Main Base. Hill AFB is located in Davis and Weber counties. Both of these counties reside in the area newly designated as serious nonattainment for $PM_{2.5}$.

Hill AFB provides worldwide logistics support for some of the Air Force and Department of Defense's (DoD) most sophisticated weapon systems. The base is also a complex organization of several Product Directorates, DoD tenant agencies and divisions, and government contractors. Support operations include systems management, spare parts, and major maintenance, repair, rework, and modification services. Hill AFB has extensive industrial facilities for painting, paint stripping, plating, parts warehousing/distribution, engine testing, and wastewater treatment. Hill AFB is a major source of $PM_{2.5}$ and a major source for its precursors, oxides of nitrogen (NO_x); volatile organic compounds (VOC); as well as a minor source of ammonia (NH_3) and sulfur dioxide (SO_2) emissions.

SECTION 2

BACT Analysis for Significant Source Categories

2.1 Introduction

The EPA has developed a process for conducting BACT analyses, which is referred to as the "top-down" method. The following steps to conducting a top-down analysis are listed in the EPA's New Source Review Workshop Manual and are the basis for the analysis contained in this report (EPA, 1990):

- **Step One—Identify All Available Control Technologies (this is accomplished via several methods).** A thorough search on the EPA's reasonable available control technology (RACT)/BACT/lowest achievable emission rate (LAER) Clearinghouse (RBLC); federal/state/local NSR permits; control technology vendors; and environmental consultants.
- **Step Two—Eliminate Technically Infeasible Options**. Technically feasible option means a technology that is available and applicable to the permittee's operations. This demonstration should show, based on physical, chemical, and engineering principles, that technical difficulties would preclude the successful use of the control option on the emission unit under review. Technically infeasible control options are then eliminated from further consideration in the BACT analysis.
- **Step Three—Rank Remaining Control Technologies by Control Effectiveness**. This ranking should include control efficiencies, expected emission rates, or expected emissions reductions.
- **Step Four—Evaluate Most Effective Controls and Document Results**. The factors considered while evaluating the most effective control options are energy impacts, environmental impacts, and economic impacts. If the top control option is not selected as BACT, evaluate the next most-effective control option.
- **Step Five—Select BACT**. The final step in the process is to select the BACT level control based on the analysis provided in the previous four steps.

2.2 BACT Determination for Significant Source Categories

The largest emission source categories of $PM_{2.5}$, NO_x, and VOC at Hill AFB are listed in the Table 2-1 below. Source categories with nominal $PM_{2.5}$ and precursor emissions are addressed in Section 4.

Table 2-1. Hill AFB Source Categories with $PM_{2.5}$ and Precursor Emissions

Source Category	Number of Sources	Pollutants Emitted
Internal Combustion	97 emergency generators	$PM_{2.5}$, NO_x, VOC
Landfill Gas Generators	three generators	$PM_{2.5}$, NO_x, VOC
Surface Coating	56 paint booths	VOC
Degreasers	271 degreasers	VOC
Spray Gun Cleaning	53 cleaning tanks	VOC
Chemical Stripping	four stripping lines including two methylene chloride tanks	VOC
Off Wing Jet Engine Testing	five hush houses	$PM_{2.5}$, NO_x, VOC

Table 2-1. Hill AFB Source Categories with $PM_{2.5}$ and Precursor Emissions

Source Category	Number of Sources	Pollutants Emitted
Gasoline Storage Tanks	10 aboveground tanks and six underground tanks	VOC

2.2.1 Step One—Identify All Available Control Technologies

The RBLC and recent permitting review identifies the following as possible control technologies for various source categories at Hill AFB. Available control technologies are provided in Table 2-2.

Table 2-2. Available Control Technologies for Hill AFB Source Categories of $PM_{2.5}$ and Precursor Emissions

Control Technology	Description	Source Category Controlled	Pollutant Controlled	Currently Being Used at Hill AFB	Possible New Technology
Diesel Particulate Filter	A porous substrate that permits gases in the engine exhaust to pass through while trapping the $PM_{2.5}$.	Internal Combustion: Diesel Fired Stationary Engines	$PM_{2.5}$		X
Good Combustion Practices/NSPS and NESHAP Standards	Following the manufacturer's recommendation for managing air/fuel ratio, combustion timing and location; and complying with applicable NSPS and NESHAP standards.	Internal Combustion: Diesel and Landfill Gas Fired Engines	All	X	
Selective Catalytic Reduction	Reduces NO_x to N_2 with the aid of ammonia or urea and a catalyst bed.	Internal Combustion: Diesel Fired Stationary Engines	NO_x		X
Fuel Type Restrictions	Limiting fuel usage to the most favorable fuel type for the particular combustion unit.	Internal Combustion: All Stationary Engines	All	X	
HEPA Filter	Filter with 99.97% efficiency for the removal of 0.3µm diameter and larger $PM_{2.5}$.	Surface Coating	$PM_{2.5}$	X	
One Stage Dry Filter	A dry particulate filter system using one layer of filter media to remove particulate.	Surface Coating	$PM_{2.5}$	X	
Two Stage Dry Filter	A dry particulate filter system using two layers of filter media to remove particulate.	Surface Coating	$PM_{2.5}$	X	

Table 2-2. Available Control Technologies for Hill AFB Source Categories of $PM_{2.5}$ and Precursor Emissions

Control Technology	Description	Source Category Controlled	Pollutant Controlled	Currently Being Used at Hill AFB	Possible New Technology
Three Stage Dry Filter	A dry particulate filter system using three layers of filter media to remove particulate.	Surface Coating	$PM_{2.5}$	X	
Activated Carbon	Adsorbs VOCs that are emitted from booths.	Surface Coating	VOC		X
Cover on Equipment	Equipment is covered when not in use to reduce VOC emissions.	Degreasers and Spray Gun Cleaning	VOC	X	
Immiscible Solvents in Tanks	Layer of water and phenol in the tank.	Chemical Stripping	VOC	X	
Operating Procedures	Proper operations and waste solvent reclamation where feasible.	Degreasers and Spray Gun Cleaning	VOC	X	
Operating Procedures	Proper testing operations.	Off Wing Jet Engine Testing	All	X	
Stage 1 Vapor Recovery System	When filling a gasoline storage tank vapors are transferred from the storage tank to the tanker truck.	Gasoline Storage Tanks	VOC	X	

2.2.2 Step Two—Eliminate Technically Infeasible Options

Table 2-3 below lists the control technologies not technically feasible for operations at Hill AFB.

Table 2-3. Technically Infeasible Control Technologies for Hill AFB

Control Technology	Source Category	Reasons for Being Technically Infeasible
Selective Catalytic Reduction	Internal Combustion: Landfill Gas Fired Generators	The majority of the internal combustion emissions are from the landfill gas generators. This technology is designed to reduce NOx emission from diesel generators by about 85%. This technology does not perform well with variable fuel sources and poisoning of catalysts frequently occurs when halogenated compounds are present in the fuel source.
Activated Carbon	Surface Coating	While activated carbon is widely used to control VOC emissions and pilot scale projects have been implemented with modest success on small automotive size paint booths, it is not used at large aerospace manufacturing and rework facilities. For a control to be feasible, it must have a practical potential for application and this has not been demonstrated in industry or R&D testing for facilities with booths as large and with comparable usage rates as Hill AFB.

2.2.3 Step Three—Rank Remaining Control Technologies by Control Effectiveness

Because the available controls cover multiple source categories and more than one pollutant, ranking technologies by control effectiveness does not provide a meaningful comparison. All technically feasible control technologies not already in use at Hill AFB will be evaluated in step four below for possible implementation at the facility.

2.2.4 Step Four—Evaluate Most Effective Controls and Document Results

Most of the control technologies identified in the RBLC are already implemented at Hill AFB. For diesel fired emergency generators (internal combustion source category), Table 2-4 provides effectiveness of identified controls based on economic considerations.

Table 2-4. Economic Analysis of Possible New Control Technologies at Hill AFB

Control Technology	Source Category	Annualized Cost, $*	Pollutant	$/Ton Controlled**
Selective Catalytic Reduction	Internal Combustion: Emergency Generators	$79,600 - $665,000(1)	NO_x	$123,000 - >$1M
Diesel Particulate Filter	Internal Combustion: Emergency Generators	$14,400,000(2)	$PM_{2.5}$	$12,200,000

Notes:
*Includes initial capital, installation, and annual operating costs. Assumes 10 year life of controls (SCAQMD, 2016).
**Cost per ton of pollutant controlled is based on maximum annual emissions from 2010-2016 for external combustion and 2011 for other sources.
1. EPA-452/F-03-032, Air Pollution Control Technology Fact Sheet, dollar amount is calculated in 1999 dollars.
2. California Air Resources Board, Analysis of the Technical Feasibility and Costs of After-Treatment Controls on New Emergency Standby Engines.

2.2.5 Step Five—Select BACT

BACT determinations for individual source categories are presented in Table 2-5.

Table 2-5. Hill AFB Source Category BACT Determinations

Source Category	Proposed BACT	Pollutants Emitted
Chemical Stripping	Immiscible solvents in tanks	VOC
Degreasers	Cover on degreasers and operating procedures	VOC
Gasoline Storage Tanks	Stage I vapor recovery and/or NSPS and NESHAP requirements	VOC
Internal Combustion	Good combustion practices, NSPS and NESHAP standards, and limiting fuel type to the most favorable for the individual unit	$PM_{2.5}$, NO_x, VOC
Landfill Gas Generators	Good combustion practices	$PM_{2.5}$, NO_x, VOC
Off Wing Jet Engine Testing	Operating procedures	$PM_{2.5}$, NO_x, VOC
Spray Gun Cleaning	Covers on tanks and operating procedures	VOC
Surface Coating	One, two, and three stage dry filtration, HEPA filtration, and NESHAP standards	$PM_{2.5}$

SECTION 3

BACT Analysis for External Combustion Source Category

3.1 Introduction

Hill AFB has developed a detailed BACT analysis for the external combustion source category (boilers) at the request of UDAQ. For the purposes of this analysis, boilers at Hill AFB have been grouped into four categories: (1) older boilers that have been grandfathered into the facility's permit, (2) boilers that are not subject to New Source Performance Standards (NSPS) Subpart Dc: Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units, (3) boilers subject to NSPS Dc with heat input rating greater than 50 MMBTU/hr. or 4) boilers subject to NSPS Dc with heat input rating less than 50 MMBTU/hr.

The boilers covered in this BACT analysis are listed below in Table 3-1.

Table 3-1. Hill AFB Boilers

Source ID (AQUIS)	Capacity (MMBTU/hr)	Fuel Type(s)	Existing Control Technology and/or Emission Rate Limit	Comments
3415	29	Dual fired with diesel or natural gas	Low NO_x burners	Subject to NSPS Dc and <50 MMBTU/hr
3416	29	Dual fired with diesel or natural gas	Low NO_x burners	Subject to NSPS Dc and <50 MMBTU/hr
3419	10.5	Dual fired with diesel or natural gas	Flue gas recirculation	Subject to NSPS Dc and <50 MMBTU/hr
3426	10.5	Dual fired with diesel or natural gas	Flue gas recirculation	Subject to NSPS Dc and <50 MMBTU/hr
34386	20.7	Dual fired with diesel or natural gas	None	Subject to NSPS Dc and <50 MMBTU/hr
34388	25	Waste oil	None	Subject to NSPS Dc and <50 MMBTU/hr
34981	10.5	Dual fired with diesel or natural gas	None	Subject to NSPS Dc and <50 MMBTU/hr
3507	87.5	Dual fired with diesel or natural gas	Low NO_x burners and 0.09 lb/MMBtu	Subject to NSPS Dc and >50 MMBTU/hr
3508	87.5	Dual fired with diesel or natural gas	Low NO_x burners, 0.09 lb/MMBtu	Subject to NSPS Dc and >50 MMBTU/hr
3536	10.5	Dual fired with diesel or natural gas	Low NO_x burners	Subject to NSPS Dc and <50 MMBTU/hr
3538	10.5	Dual fired with diesel or natural gas	Low NO_x burners	Subject to NSPS Dc and <50 MMBTU/hr
3501	80	Dual fired with diesel or natural gas	0.09 lb/MMBtu	Not subject to NSPS Dc

Table 3-1. Hill AFB Boilers

Source ID (AQUIS)	Capacity (MMBTU/hr)	Fuel Type(s)	Existing Control Technology and/or Emission Rate Limit	Comments
3502	80	Dual fired with diesel or natural gas	0.09 lb/MMBtu	Not subject to NSPS Dc
3519	60	Dual fired with diesel or natural gas	0.09 lb/MMBtu	Not subject to NSPS Dc
3503	50	Dual fired with diesel or natural gas	None	Grandfathered
3504	50	Dual fired with diesel or natural gas	None	Grandfathered
3505	50	Dual fired with diesel or natural gas	None	Grandfathered
3506	50	Dual fired with diesel or natural gas	None	Grandfathered
3520	40	Dual fired with diesel or natural gas	None	Grandfathered
3521	40	Dual fired with diesel or natural gas	None	Grandfathered

Note:
The boilers presented are representative of all active boilers that are operated on a regular basis and include the units that are the largest and oldest thus possessing the largest potential for emission reductions. Some inactive and smaller boilers have been included and assigned an emission value for due diligence. Many other smaller boilers exist at the facility that are only run intermittently, if at all, and therefore do not have potential for realistic emissions reductions.

3.2 NO_X BACT Analysis

The following describes the NO_x BACT analysis for the boilers listed in Table 3-1.

3.2.1 Step One—Identify All Available Control Technologies

Control technologies identified for the control of NOx from commercial and institutional size boilers are listed in Table 3-2.

Table 3-2. Available Controls for NO_x Emissions from Boilers

Control Technology	Description
Selective Catalytic Reduction	A catalyst and an injection of a reductant are used to convert NO_x in the exhaust to water and nitrogen. The use of a catalyst allows for the redox reaction to take place at exhaust temperatures between 440 and 840 degrees Fahrenheit.
Selective Non-Catalytic Reduction	An injection of a reductant without the aid of a catalyst is used to convert NO_x in the exhaust to water and nitrogen. Exhaust temperatures must range from 1,400 to 2,000 degrees Fahrenheit to be effective.
Low NOx Burners	Natural gas burner designed to produce less NO_x.
Ultra-Low NOx Burners	Natural gas burner designed to reduce NO_x emission generation to the lowest rate achievable.
Flue Gas Recirculation	A portion of cool exhaust gases are recirculated back to the combustion zone in order to lower the flame temperature and reduce NO_x formation.

Table 3-2. Available Controls for NO_x Emissions from Boilers

Control Technology	Description
Induced Flue Gas Recirculation	Uses a combustion air fan to recirculate the flue gases back into the combustion zone. Flue gases are premixed with combustion air and introduced into the flame through the burner.
Good Combustion Practices	Following the manufacturer's recommendations for fuel and air mixture and burner operation.
Use of Only Pipeline Quality Natural Gas as Fuel	Natural gas combustion when combined with good combustion practices generates less emissions than other fuels.
Runtime Limitations	Limiting the operation of a source where practical to eliminate excess emissions.

3.2.2 Step Two—Eliminate Technically Infeasible Options

All options except runtime limitations and use of only pipeline quality natural gas as a fuel are technically feasible and will be considered in the following steps. Limiting the allowable hours of operation could undermine the mission of the facility and compromise national security. Therefore, runtime limitations are not technically feasible. The sole use of only pipeline quality natural gas is also infeasible because the Air Forces' readiment requirements specified in Air Force Instruction (AFI 32-1068) dictate that the boilers must have an alternate fuel source for redundancy to continue the mission in times of fuel shortages or curtailment. For this reason, use of only pipeline quality natural gas is not technically feasible. It is feasible however, to limit the use of an alternate fuel to the minimum required by the Air Forces' readiment preparedness guidance and to times of natural gas curtailment and this option will be considered in further steps.

3.2.3 Step Three—Rank Remaining Control Technologies by Control Effectiveness

Controls can be divided into two categories, those that can be added-on to the source and require a capital investment and those that require a change in the source operation such as requiring a specific fuel type and good combustion practices. Controls of the add-on variety have an associated control efficiency that can be quantified and operational type controls are appropriately described qualitatively as a best management practice. Table 3-3 provides an effectiveness ranking of each remaining control.

Table 3-3. Ranking of Technically Feasible Control Technologies

Control Technology	Potential NO_x Reduction(1)
Selective Catalytic Reduction	80%
Ultra-low NOx burner	80%
Flue Gas Recirculation	65%
Induced Flue Gas Recirculation	65%
Selective Non-Catalytic Reduction	60%
Low NO_x Burners	55%
Good Combustion Practices	Best management practice
Alternate Fuel Runtime Limitations	Best management practice

Note: 1. EPA-453/R-94-022, Alternative Control Techniques Document – NO_x Emissions from Industrial/Commercial/Institutional (ICI) Boilers.

Flue gas recirculation and induced flue gas recirculation have identical levels of potential NO_x reduction and are similar technologies with flue gas recirculation having a lower annualized cost. Therefore, only flue gas recirculation will be considered in step four. Other control technologies have similar or equal control efficiencies but the technologies differ and therefore will be considered independently in the next step.

3.2.4 Step Four—Evaluate Most Effective Controls and Document Results

An economic analysis of the remaining add-on controls was conducted according to EPA guidance and industry standards for boiler operation. Each boiler listed in Table 3-1 was evaluated separately based on maximum actual annual emissions from 2010 to 2016 with the following exceptions. Boilers in building 260 used projected actual emissions which were estimated considering future steam requirements after the neighboring municipal solid waste burn plant at the Wasatch Integrated Waste Management District (WIWMD) and associated steam supply is shut down. WIWMD provided a significant amount of steam to Hill AFB and the majority of the steam requirements to be made up in its absence are expected to come from the building 260 boilers. Where a boiler has been idle since 2010 and not located in Building 260, one ton of NO_x emissions were assigned to the unit for estimating purposes. Details of how emissions were assigned to each unit and the results of the economic evaluation are provided in Table 3-4 and Table 3-5 below.

Table 3-4. Hill AFB Boiler Emissions Used for BACT Analysis

Source ID (AQUIS)	Annual NOx Emission Used in BACT Analysis (lbs)	Boiler Category	Comment
3415	2,670	Subject to NSPS Dc	2010 actual
3416	8,060	Subject to NSPS Dc	2011 actual
3419	2,000	Subject to NSPS Dc	Inactive boiler assigned one ton of NO_x emissions for estimating purposes
3426	2,000	Subject to NSPS Dc	Inactive boiler assigned one ton of NO_x emissions for estimating purposes
34386	1,240	Subject to NSPS Dc	2012 actual
34388	2,000	Subject to NSPS Dc	Inactive boiler assigned one ton of NO_x emissions for estimating purposes
34981	2,100	Subject to NSPS Dc	2010 actual
3507	11,600	Subject to NSPS Dc	Projected actual for Building 260
3508	11,600	Subject to NSPS Dc	Projected actual for Building 260
3536	468	Subject to NSPS Dc	2013 actual
3538	1,630	Subject to NSPS Dc	2011 actual
3501	11,600	Not subject to NSPS Dc	Projected actual for Building 260
3502	11,600	Not subject to NSPS Dc	Projected actual for Building 260
3519	12,400	Not subject to NSPS Dc	2011 actual
3503	2,895	Grandfathered	Projected actual for Building 260
3504	2,900	Grandfathered	Projected actual for Building 260
3505	2,900	Grandfathered	Projected actual for Building 260
3506	2,900	Grandfathered	Projected actual for Building 260

Table 3-4. Hill AFB Boiler Emissions Used for BACT Analysis

Source ID (AQUIS)	Annual NOx Emission Used in BACT Analysis (lbs)	Boiler Category	Comment
3520	2,070	Grandfathered	2013 actual
3521	4,710	Grandfathered	2010 actual

Table 3-5. Economic Analysis of Technically Feasible Add-On Controls

Boiler Category	Control Technology	Annualized Cost ($)*	$/Ton Controlled**
Grandfathered	Flue Gas Recirculation	$22,700 - $28,400	$14,900 - $33,700
	Low NO_x Burners(1)	$45,800 - $60,100	$35,400 - $80,300
	Ultra-low NO_x Burners(2)	$45,800 - $60,100	$24,300 - $51,900
	Selective Catalytic Reduction(3)	$190,200 - $237,900	$101,000 - $230,000
	Selective Non-Catalytic Reduction	$156,000 - $195,000	$111,000 - $225,000
Not subject to NSPS	Flue Gas Recirculation	$45,400 - $85,200	$12,100 - $21,100
	Low NO_x Burners(1)	$68,700 - $82,300	$20,100 - $25,800
	Ultra-low NO_x Burners(2)	$68,700 - $82,300	$13,800 - $17,800
	Selective Catalytic Reduction(3)	$285,000 - $334,000	$57,400 - $72,000
	Selective Non-Catalytic Reduction	$234,000 - $313,00	$62,900 - $90,000
Subject to NSPS and >50 MMBTU/hr	Flue Gas Recirculation	NA –Units are equipped with LNB, a control that provides comparable NOx reduction	
	Low NO_x Burners	NA –Units are equipped with LNB	
	Ultra-Low NO_x Burners(2)	$86,200	$59,500
	Selective Catalytic Reduction(3)	$352,000	$243,000
	Selective Non-Catalytic Reduction	NA –Units are equipped with LNB, a control that provides comparable NO_x reduction	
Subject to NSPS and <50 MMBTU/hr	Flue Gas Recirculation	$11,700 - $14,100	$17,200 - $29,200
	Low NO_x Burners(1)	$52,800 - $62,000	$107,000 - $155,000
	Ultra-Low NO_x Burners(2)	$52,800 - $62,000	$47,800 - $526,000
	Selective Catalytic Reduction(3)	$49,800 - $138,000	$117,000 - $850,000
	Selective Non-Catalytic Reduction	$40,900 - $113,000	$128,000 - $246,000

Notes:
*Includes initial capital, installation, and annual operating costs. Assumes 10 year life of controls (SCAQMD, 2016).
**Cost per ton of pollutant controlled is based on actual maximum annual emissions from 2010 to 2016 with a few exceptions. Units in Building 260 are based on projected actual emissions estimated considering future steam requirements after the neighboring WIWMD burn plant is shut down. Other boilers with no emissions since 2010 were assigned 1 ton of NO_x for estimating purposes.
1. EPA-453/R-94-022, Alternative Control Techniques Document – NO_x Emissions from Industrial/Commercial/Institutional (ICI) Boilers, dollar amount is calculated in 1992 dollars.
2. Ultra-low NO_x burners were estimated using the same installation cost as LNB with a greater efficiency applied.
3. EPA-452/F-03-032, Air Pollution Control Technology Fact Sheet, dollar amount is calculated in 1999 dollars.

3.2.5 Step Five—Select BACT

In the absence of guidance from UDAQ, Hill AFB has selected a conservative estimate of a reasonable economic cost per ton of pollutant removed of $10,000 as a screening threshold. Controls with a cost per ton below this threshold are considered economically feasible. As can be seen in Table 3-5, the most cost effective add-on control in terms of cost per ton of NO_x removed is flue gas recirculation. Costs associated with flu gas recirculation range from $12,100 to $33,700 per ton of NO_x removed depending on the specific emission unit. This range is above the screening threshold and therefore no further economic analysis is required.

The cost of add-on controls is a substantial sum and beyond what is a reasonable amount for installing pollution controls. Therefore, no add-on controls are selected as BACT for control of NO_x from any of the boilers. It should be noted that the estimates provided in Table 3-5 are generic and do not include specific challenges specific to each emission unit such as access limitations, asbestos abatement, and mission critical requirements unique to an Air Force Installation. Because of these unique challenges, it is believed that costs for each emission unit would be considerably higher than the screening values provided in Table 3-5.

The best management practices of good combustion practices and limiting the use of alternate fuels other than pipeline quality natural gas to the minimum amount required to meet Air Force readiment requirements in AFI 32-1068 except during periods of natural gas curtailment are control measures that can be implemented with nominal impact to existing operations. Both of these best management practices are selected as BACT for NO_x emission control for each of the boilers listed in Table 3-1 along with existing emission control technologies where applicable.

3.3 $PM_{2.5}$, SO_2, VOC, and NH_3 BACT Analysis

3.3.1 Step One—Identify All Available Control Technologies

The RBLC identifies use of pipeline quality natural gas and good combustion practices as a control technology for minimizing $PM_{2.5}$, SO_2, NH_3, and VOC emissions from boilers.

3.3.2 Step Two—Eliminate Technically Infeasible Options

Limiting the use of fuels other than pipeline quality natural gas is not technically feasible because duel fuel boilers are required per Air Force readiment requirements detailed in AFI 32-1068. It is feasible to limit the use of alternate fuels to the minimum required to sustain the mission of the facility and periods of natural gas curtailment.

3.3.3 Step Three—Rank Remaining Control Technologies by Control Effectiveness

The identified control technologies are best management practices and therefore effectiveness of each is qualitative in nature. Each technology is given equal standing with regard to effectiveness.

3.3.4 Step Four—Evaluate Most Effective Controls and Document Results

Not applicable because all potential technologies identified in step one are selected as BACT.

3.3.5 Step Five—Select BACT

Both identified controls of the use of pipeline quality natural gas except for times of natural gas curtailment and maintenance and testing using alternative fuel and good combustion practices are selected as BACT for control of $PM_{2.5}$, SO_2, NH_3, and VOC emissions from the boilers listed in Table 3-1.

SECTION 4

BACT Summary for Miscellaneous Emission Sources

A summary of BACT for miscellaneous source categories at Hill AFB are shown below. Only source categories with $PM_{2.5}$ and precursor emissions are listed in Table 4-1 below.

Table 4-1. Hill AFB Miscellaneous Source Categories BACT Determination

Source Category	Proposed BACT	Pollutants Emitted
Abrasive Cleaning	Dry Filter	$PM_{2.5}$
Deicing	Air Force Operating Procedures or Technical Instructions	VOC
Diesel Storage Tanks	Air Force Operating Procedures or Technical Instructions or Stage 1 Vapor Recovery System	VOC
Fire Training	Air Force Operating Procedures or Technical Instructions	$PM_{2.5}$, NOx, SO_2, VOC
General Solvent Use	Air Force Operating Procedures or Technical Instructions and NESHAP Standards	VOC
Grinding	Dry Filters	$PM_{2.5}$
Jet Fuel Storage Tanks	Air Force Operating Procedures or Technical Instructions	VOC
Landfill/Storage Piles	Air Force Operating Procedures or Technical Instructions	$PM_{2.5}$
Laser Depainting	Dry Filters	$PM_{2.5}$
Liquid Calibration Units	Air Force Operating Procedures or Technical Instructions	VOC
Metal Plating	Air Force Operating Procedures or Technical Instructions	$PM_{2.5}$, VOC
Miscellaneous Armaments Firing	Air Force Operating Procedures or Technical Instructions	$PM_{2.5}$, NH_3
Nondestructive Inspection	Scrubber	VOC
Process Tanks	Air Force Operating Procedures or Technical Instructions	VOC
Pumps, Valves, and Flanges	Air Force Operating Procedures or Technical Instructions	VOC
Roads	Paving and Dust Suppressants	$PM_{2.5}$
Rocket Motor Testing (Static Firing)	Air Force Operating Procedures or Technical Instructions	$PM_{2.5}$
Site Remediation	Air Force Operating Procedures or Technical Instructions	VOC
Thermal Spray Coating	Dry Filter	All
Waste Solvent and Fuel Reclamation	Air Force Operating Procedures or Technical Instructions	VOC
Wastewater Treatment	Air Force Operating Procedures or Technical Instructions	VOC
Woodworking	Cyclone	$PM_{2.5}$

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SECTION 5

Summary of Facility Permitting Actions and BACT Determinations

Table 5-1 provides a comprehensive list of all Approval Orders obtained by Hill AFB and the relevant BACT requirements contained therein.

Table 5-1. Hill AFB Approval Orders and BACT Determination

Approval Order #	Project Description	BACT Determination *(Italicized BACT Conditions are from Title V Operating Permit #1100007003)*	Incorporates Flexibility Provisions
DAQE-AN101210247-17	Dust Collectors that are not Subject to 40 CFR 63 Subpart GG	• Visible emissions from the affected emission units shall be no greater than 10 percent opacity.	N
DAQE-AN101210245-16	Boilers	• The combined heat input to all boilers as defined in this permit (except those classified as exempt and grandfathered) shall not exceed 2.76E12 BTU per rolling 12-month period. • Visible emissions shall be no greater than 10 percent opacity for all boilers (except those classified as exempt and grandfathered) as defined in this permit. • For boilers with capacities of 50 MMBTU per hour or greater (excluding grandfathered units), emissions of NOx shall not exceed the product of 0.09 lb/MMBtu * rated capacity of the unit in MMBtu/hr.	N
DAQE-AN101210240B-16	Industrial Wastewater Treatment Plant - Air Stripper Towers	• The emissions of VOCs shall be no greater than 12 tons per rolling 12-month period.	N
DAQE-AN101210241-15	Fuel Distillation	• Extraction of JP-5, JP-6, JP-8, JP-10 or Jet A fuels (or equivalent fuels to be determined by the Director) shall not be greater than 170,820 gallons per rolling 12-month period.	N
DAQE-AN101210238-15	Dust Collectors that are Subject to 40 CFR 63 Subpart GG	• Visible emissions from the affected emission units shall be no greater than 10 percent opacity. • *The permittee shall operate and maintain the equipment according to the manufacturer's specifications or locally prepared operating procedures. During periods of malfunctions of such equipment, the permittee may use substitute materials during the repair period provided the substitute materials used are those available that minimize organic HAP emissions. In no event shall substitute materials be used for more than 15 days annually, unless such materials are organic HAP free.*	N
DAQE-AN101210237-15	Air Handlers	• The combined consumption of natural gas in the air handling equipment rated >=5 MMBTU/hr and <=20 MMBTU/hr shall not exceed 450 MMCF of natural gas consumed per rolling 12-month period.	Y

Table 5-1. Hill AFB Approval Orders and BACT Determination

Approval Order #	Project Description	BACT Determination *(Italicized BACT Conditions are from Title V Operating Permit #1100007003)*	Incorporates Flexibility Provisions
		• Flexibility Provisions - Hill is allowed to add or modify any air handler rated >=5 MMBTU/hr and <= 20 MMBTU/hr equipment with a low-NOx burner, provided that each of the following conditions are met: ○ The proposed addition or modification does not cause an increase in the currently established base-wide limit of 450 MMCF of natural gas consumed per rolling 12-month period for air handlers rated >=5 MMBTU/hr and <=20MMBTU/hr. ○ The new or modified equipment must meet the requirements listed in this permit as BACT.	
DAQE-AN101210233-14	Hydrazine Thermal Oxidizer	• Combustion temperature shall be maintained at a minimum of 1,800 degrees Fahrenheit during operation of the hydrazine thermal oxidizer. • Test of the emergency power unit (EPU) shall be no greater than 520 tests per rolling 12-month period.	N
DAQE-AN101210232-13	Laser Depainting	• Visible emissions from the affected emission units shall be no greater than 10 percent opacity. • *The permittee shall operate and maintain the equipment according to the manufacturer's specifications or locally prepared operating procedures. During periods of malfunctions of such equipment, the permittee may use substitute materials during the repair period provided the substitute materials used are those available that minimize organic HAP emissions. In no event shall substitute materials be used for more than 15 days annually, unless such materials are organic HAP free.*	N
DAQE-AN101210229-12	Thermal Metal Spray	• Visible emissions from the affected emission units shall be no greater than 10 percent opacity. • Processes shall be controlled by either a cartridge filter or water fill filtration as applicable.	N
DAQE-AN101210228-12	Consolidated Degreasers	• VOC emissions shall not exceed 35 tons per rolling 12-month period from solvent cleaning operations. • Flex Pre-Approved BACT Determination for Modified Immersion Cold Cleaners (non-NESHAP) operations: ○ Waste or used solvent shall be stored in covered containers. Waste solvents or waste materials that contain solvents shall be disposed of by recycling, reclaiming, by incineration in an incinerator approved to process hazardous materials, or by an alternate means approved by the Director.	Y

Table 5-1. Hill AFB Approval Orders and BACT Determination

Approval Order #	Project Description	BACT Determination *(Italicized BACT Conditions are from Title V Operating Permit #1100007003)*	Incorporates Flexibility Provisions
		○ Hill shall drain solvent cleaned parts for 15 seconds or until dripping has stopped, whichever is longer. Parts having cavities or blind holes shall be tipped or rotated while draining. DAQE-AN101210228-12 Page 6 ○ If the solvent volatility is greater than 4.3 kPa (33 mm Hg or 0.6 psi) measured at 38 degrees C (100 degrees F), or if solvent is heated above 50 degrees C (120 degrees F), then one of the following control devices shall be used: (a) Freeboard that gives a freeboard ratio greater than 0.7 (b) Water cover if the solvent is insoluble in and heavier than water (c) Other systems of equivalent control, such as a refrigerated chiller or carbon absorption ○ A cover shall be installed which shall remain closed except during actual loading, unloading or handling of parts in cleaner. ○ If used, the solvent spray shall be a solid fluid stream at a pressure which does not cause excessive splashing and may not be a fine, atomized or shower type spray. • FLEX Pre-Approved BACT Determination for Remote Reservoir Cleaning Equipment: ○ Waste or used solvent shall be stored in covered containers. Waste solvents or waste materials that contain solvents shall be disposed of by recycling, reclaiming, by incineration in an incinerator approved to process hazardous materials, or by an alternate means approved by the Director. ○ Hill AFB shall drain solvent cleaned parts for 15 seconds or until dripping has stopped, whichever is longer. Parts having cavities or blind holes shall be tipped or rotated while draining. ○ Hill's remote-reservoir batch cold solvent cleaning machines shall employ a tightly fitting cover over the solvent sump that shall be closed at all times except during the cleaning of parts. ○ Tanks, containers and all associated equipment shall be maintained in good operating condition and leaks shall be repaired immediately or the degreaser shall be shutdown. ○ If used, the solvent spray shall be a solid fluid stream at a pressure which does not cause excessive splashing and may not be a fine, atomized or shower type spray. • FLEX Pre-Approved BACT Determination for Open Top Vapor Degreasing Equipment: ○ Equip the vapor degreaser with a cover that can be opened and closed without disturbing the vapor zone. The cover shall be closed except when processing workloads through the degreaser.	

Table 5-1. Hill AFB Approval Orders and BACT Determination

Approval Order #	Project Description	BACT Determination *(Italicized BACT Conditions are from Title V Operating Permit #1100007003)*	Incorporates Flexibility Provisions
		○ Install one of the following control devices: (a) Equipment necessary to sustain: (i) a freeboard ratio greater than or equal to 0.75, and (ii) a powered cover if the degreaser opening is greater than 1 square meter (10 square feet), (b) Refrigerated chiller, (c) Enclosed design (cover or door opens only when the dry part is actually entering or exiting the degreaser), (d) Carbon adsorption system, with ventilation greater than or equal to 15 cubic meters per minute per square meter (50 cubic feet per minute per square foot) of air/vapor area when cover is open and exhausting less than 25 parts per million of solvent averaged over one complete adsorption cycle. ○ Minimize solvent carryout by: (a) racking parts to allow complete drainage, (b) moving parts in and out of the degreaser at less than 3.3 meters per minute (11 feet per minute), (c) holding the parts in the vapor zone at least 30 seconds or until condensation ceases, (d) tipping out any pool of solvent on the cleaned parts before removal, and (e) Allowing the parts to dry within the degreaser for at least 15 seconds or until visibly dry. ○ Spray parts only in or below the vapor level, ○ Not use ventilation fans near the degreaser opening, nor provide exhaust ventilation exceeding 20 cubic meters per minute per square meter (65 cubic feet per minute per square foot) in degreaser open area, unless necessary to meet State and Federal occupational, health, and safety requirements. The exhaust ventilation flow indicated above shall be measured using EPA Reference Methods 1 and 2 of 40 CFR Part 60, or by EPA-approved equivalent state methods; ○ Not degrease porous or absorbent materials, such as cloth, leather, wood or rope; ○ Not allow workloads to occupy more than half of the degreaser's open top area; ○ Ensure that solvent is not visually detectable in water exiting the water separator; ○ Install safety switches on the following: (a) Condenser flow switch and thermostat (shuts off sump heat if condenser coolant is either not circulating or too warm); and (b) Spray switch (shuts off spray pump if the vapor level drops excessively, i.e., greater than 10 cm (4 inches); and ○ Ensure that the control device specified above meet the applicable requirements of R307-340-4 and 15.	
DAQE-AN101210225-12	Liquid Calibration Systems	• FLEX Pre-Approved BACT Determination: ○ The total amount of VOC emissions generated by the liquid calibration systems shall not exceed 10 tons per rolling 12-month period.	Y

Table 5-1. Hill AFB Approval Orders and BACT Determination

Approval Order #	Project Description	BACT Determination *(Italicized BACT Conditions are from Title V Operating Permit #1100007003)*	Incorporates Flexibility Provisions
DAQE-AN101210220-12	POL Fuel Tank AQ 38535	• Combined throughput of JP-4, JP-5, JP-6, JP-8, JP-10, Jet A, or equivalent fuels as determined by the Director in the 275,000 gallon fuel storage tank shall be no greater than 36,000,000 gallons per rolling 12-month period for the affected emission unit. • Tank shall be an internal floating roof tank.	N
DAQE-AN101210224-12	POL Fuel Tank AQ 3634	• Combined throughput of JP-4, JP-5, JP-6, JP-8, JP-10, Jet A, or equivalent fuels as determined by the Director in the 2,310,000 gallon fuel storage tank shall be no greater than 27,720,000 gallons per rolling 12-month period for the affected emission unit.	N
DAQE-AN101210223-12	Engine Testing (Hush House)	• The total emissions from all of the Jet Engine Testing, Auxiliary Power Testing, and Engine pickling operations on the base, combined, shall not exceed the following emission limits in tons per rolling 12-Month Period: PM_{10} = 4.5, SO_2 = 8.1, NO_x = 64, CO = 48.0, VOC = 24. • Visible emissions, from Jet Engine Testing and Auxiliary Power Testing, shall be no greater than 20 percent opacity except for a period not exceeding 1 minute in any hour.	N
DAQE-AN101210222-12	Engine Test Stand	• The permittee shall not exceed the following consumption limit: 10.8 MMSCF/yr of natural gas consumed per rolling 12-month period for the curing and burnout ovens. • Visible emissions from all ovens shall be no greater than 10 percent opacity from the curing and burnout ovens. • Combined JP-4, JP-5, JP-6, JP-8, JP-10, Jet A, or equivalent fuels as determined by the Director, and diesel fuel consumed shall be no greater than 40,000 gallons per rolling 12-month period. • Visible emissions from JP-4, JP-5, JP-6, JP-8, JP-10, Jet A, or equivalent fuels as determined by the Director, and diesel-fired engines shall be no greater than 20 percent opacity. • Gasoline fuel consumed by the IC engine/turbine test stands shall be no greater than 5,400 gallons per rolling 12 month period. • For each gasoline-fired affected emission unit, the permittee shall not allow, cause or permit visible emissions. • *Sulfur content of any fuel oil combusted shall be no greater than 0.85 pounds sulfur per MMBtu gross heat input unless otherwise specified in this permit.*	N
DAQE-AN101210221-12	POL Fuel Tank AQ 3628, 3629, 3630, 3631	• Combined throughput of JP-4, JP-5, JP-6, JP-8, JP-10, Jet A, or equivalent fuels as determined by the Director, in the 1,070,764 gallon, 2,320,209 gallon, 366,063 gallon, and 550,400 gallon fuel storage tanks shall be no greater than 52,920,000 gallons per rolling 12-month period.	N

Table 5-1. Hill AFB Approval Orders and BACT Determination

Approval Order #	Project Description	BACT Determination *(Italicized BACT Conditions are from Title V Operating Permit #1100007003)*	Incorporates Flexibility Provisions
		• Tanks shall be internal floating roof tanks with vapor-mounted or liquid-mounted primary seals.	
DAQE-AN101210219-12	Fuel Hydrant System	• Combined throughput of JP-4, JP-5, JP-6, JP-8, JP-10, Jet A, or equivalent fuels as determined by the Director in the two 420,000 gallon fuel storage tanks shall be no greater than 34,000,000 gallons per rolling 12-month total. • The 420,000 gallon tanks are equipped with an internal floating roof with primary and secondary seals and a submerged inlet.	N
DAQE-AN101210216-11	Dust Collector for Evaluation and Inspection Shop	• Visible emissions shall be no greater than 10 percent opacity. • *The permittee shall operate and maintain the equipment according to the manufacturer's specifications or locally prepared operating procedures. During periods of malfunctions of such equipment, the permittee may use substitute materials during the repair period provided the substitute materials used are those available that minimize organic HAP emissions. In no event shall substitute materials be used for more than 15 days annually, unless such materials are organic HAP free.*	N
DAQE-AN0101210215-11	Waste Solvent Reclamation	• The total amount of waste solvent reclaimed shall be no greater than 40,000 gallons per rolling 12-month period. • The permittee shall operate each affected emission unit as specified below: ○ A cover shall be installed which shall remain closed except during set up of reclamation operations or when adding or removing solvent. ○ Waste or used solvent shall be stored in covered containers. Waste solvents or waste materials which contain solvents shall be disposed of by recycling, reclaiming, by incineration in an incinerator approved to process hazardous materials, or by an alternate means approved by the Director. ○ Written procedures for the operation and maintenance of the waste solvent reclamation equipment shall be permanently posted in an accessible and conspicuous location near the equipment. ○ Each affected emission unit shall be equipped with either a water cooled condenser, a refrigerated chiller, carbon absorption, or other equivalent control device.	Y
DAQE-AN0101210214-11	Metal Plating	• BACT conditions for metal plating subject to Hard Chrome NESHAP: ○ All applicable provisions of 40 CFR 63, National Emission Standards for Hazardous Air Pollutants (NESHAP) Subparts A and Subpart N National Emission Standards for Chromium	N

Table 5-1. Hill AFB Approval Orders and BACT Determination

Approval Order #	Project Description	BACT Determination *(Italicized BACT Conditions are from Title V Operating Permit #1100007003)*	Incorporates Flexibility Provisions
		Emissions from Hard and Decorative Chromium Electroplating and Chromium Anodizing Tanks apply to all chrome plating operations in Building 505. However, to be in compliance, this facility must operate in accordance with the most current version of 40 CFR 63. • BACT conditions for non-chrome metal plating: ○ The scrubbing liquor (scrubbers 4 – 11) shall be either fresh water (tap, deionized or distilled water acceptable) or recirculating water with fresh water makeup. The recirculation scrubbing water pH shall not be less than 2.5 or exceed 11.0. ○ Each scrubbers 4 - 11 shall be operated within plus or minus two inches of water of the provisional compliant pressure drop. A provisional compliant pressure drop range is based on operational experience. Provisional compliant pressure drop ranges shall be posted near the pressure drop monitor in a way that it is accessible to plant personnel as well as to the Director or a representative. The compliant range for each scrubber must be included in the corresponding Operation and Maintenance Plan for each of these air pollution control devices. An excursion of more than two inches of water outside the compliant range will be allowed for a maximum of ten minutes. ○ *Process controlled by existing scrubber #6 (zinc-nickel plating line): 3-stage composite mesh pad scrubber (control efficiency of 99%).* ○ The hydrogen cyanide emissions from scrubber # 6 shall not exceed 0.047 tons per rolling 12-month period. The cadmium emissions from scrubber No. 6 shall not exceed 0.00021 tons per rolling 12-month period. Based on a correlation established between cadmium emissions and the magnitude of electrical current applied during the cadmium plating process, and based on sampling results indicating that the cadmium emissions limit would be reached before the hydrogen cyanide limit (reference: report submitted by Hill AFB on April 12, 2000), compliance with a limitation of 2,460,000 amp-hours per rolling 12-month period at plating line 10 shall constitute compliance with the hydrogen cyanide and cadmium emission limits for scrubber #6.	
DAQE-AN0101210207-11	Basewide Mobile Shredder	• Visible emissions from the diesel-fired emission unit shall be no greater than 20 percent opacity except for a period not exceeding 3 minutes in any hour. • The permittee shall only operate the generator from 6 a.m. to 6 p.m. • *Engine is Tier III certified.* • *Comply with NSPS IIII and NESHAP ZZZZ, as applicable:*	N

Table 5-1. Hill AFB Approval Orders and BACT Determination

Approval Order #	Project Description	BACT Determination *(Italicized BACT Conditions are from Title V Operating Permit #1100007003)*	Incorporates Flexibility Provisions
		○ *The permittee shall operate and maintain affected emission units that achieve the emission standards as required in 40 CFR 60.4204 according to the manufacturer's written instructions or procedures developed by the permittee that are approved by the engine manufacturer, over the entire life of the engine. In addition, the permittee may only change those settings that are permitted by the manufacturer. The permittee shall also meet the requirements of 40 CFR parts 89, 94 and/or 1068, as they apply to permittee.* ○ *Fuel used shall meet the following per gallon standards of 40 CFR 80.510(b) for nonroad diesel fuel: 1. Sulfur content no greater than 15 ppm (0.0015 percent) by weight and 2. A minimum cetane index of 40 or a maximum aromatic content of 35 volume percent* ○ *Engine shall comply with the emission standards for new non-emergency CI ICE in 40 CFR 60.4201 for their 2007 model year and later stationary CI ICE, as applicable.*	
DAQE-AN0101210206-10	Building 257 Dust Collector	• Visible emissions shall be no greater than 10 percent opacity.	N
DAQE-AN0101210204-10	Composite Core Process Dust Collector	• Visible emissions from the baghouses shall be no greater than 10 percent opacity except for a period not exceeding 1 minute in any hour.	N
DAQE-AN0101210200A-09	Painting and Chemical Depainting.	• FLEX Pre-Approved BACT Determination: ○ VOC emissions shall not exceed 201.2 tons per rolling 12-month period from painting equipment or operations, solvent uses associated with paint booths, and chemical depainting operations that fall into categories A, B, C, D, E, F and G at HAFB main base and Little Mountain sites. (Categories: A: Cleaning Operations Subject to NESHAP GG, B: Primer and Topcoat Application Operations Subject to NESHAP GG, C: Depainting (Chemical) Operations Subject to NESHAP GG, D: Specialty Coating Application Operations to Aerospace Vehicles or Components, E: Surface Coating Application Operations not Subject to NESHAP GG, F: Specialty Coating Application Operations to non-Aerospace Vehicles or Components, G: Depainting (Chemical) operations not Subject to NESHAP GG.) ○ *For all applications of surface coatings to miscellaneous metal parts not subject to 40 CFR 63, Subpart GG, the permittee shall implement control techniques and work practices at all times to minimize fugitive VOC emissions. Control techniques and work practices include: (a) tight fitting covers for tanks containing VOC containing materials; (b) covered containers for solvent wiping cloths; (c) collection hoods for areas where solvent is used for cleanup; and* ○ *Proper disposal of dirty cleanup solvent. The permittee shall install, operate, and maintain process or control equipment, or both, monitoring instruments or procedures, as necessary,*	Y

Table 5-1. Hill AFB Approval Orders and BACT Determination

Approval Order #	Project Description	BACT Determination *(Italicized BACT Conditions are from Title V Operating Permit #1100007003)*	Incorporates Flexibility Provisions
		to minimize fugitive VOC emissions. Waste materials which contain solvents shall be disposed of by recycling, reclaiming or by incineration in an incinerator approved to process hazardous materials, disposal in a licensed hazwaste TSDF, or by an alternate means approved by the Director.	
DAQE-AN0101210195-09	Rocket Motor Testing, Munitions, and Armament Facility	• The combined net explosive weight (NEW) of all miscellaneous munitions tested (Building 1642) shall be no greater than 1,000 lbs per rolling 12-month period. This limit applies to all munitions with a NEW of 5 pounds or more. • The combined net explosive weight (NEW) of all rocket motors tested in the Rocket Motor Test Facility (Building 11647) shall be no greater than 19,600 pounds per rolling 12-month period. • (Proposed Language 3/16/17) From November 1 through March 1 (or current DAQ no-burn season date range): ○ 665 lbs NEW per day on unrestricted action burn days (or current DAQ terminology for days where there are no restrictions on the use of solid fuel burning devices) ○ 399 lbs NEW per day on voluntary action burn days (or current DAQ terminology for days where voluntary reductions are in place for the use of solid fuel burning devices) ○ No test firings will be allowed on mandatory action burn days (or current DAQ terminology for days where solid fuel burning devices may not be used) From March 2 through October 31 (or current date range outside of the DAQ no-burn season): ○ 665 lbs NEW per day on days with a clearing index 500 and above ○ 399 lbs NEW per day on days with a clearing index between 500 and 200 ○ No test firings will be allowed on days with a clearing index 200 and below • Test firing at the indoor test range (Building 746) shall be limited to: two 20 mm guns in one hour or one 25 mm gun in one hour or one 30 mm gun in one hour. The 12-month rolling maximum shall be 50,000 rounds of 20 mm cartridges and 20,000 rounds of 25 mm cartridges and 20,000 rounds of 30 mm cartridges, for a combined maximum of 90,000 cartridges per rolling 12-month total.	N
DAQE-AN0101210189-08	Building 507 Melt Furnaces	• Natural gas consumption from melt furnaces shall be no greater than 0.289 MMSCF per calendar year combined total for all melt furnaces.	N

Table 5-1. Hill AFB Approval Orders and BACT Determination

Approval Order #	Project Description	BACT Determination *(Italicized BACT Conditions are from Title V Operating Permit #1100007003)*	Incorporates Flexibility Provisions
DAQE-AN0101210179-07	Landfill Gas Generators	• Visible emissions shall be no greater than 10 percent opacity. • Emissions of CO shall be no greater than 3.3 grams/bhp-hr from each of the 814 bhp and 1148 bhp lean burn engines. Emissions of CO shall be no greater than 2.5 grams/bhp-hr from the 1350 bhp lean burn engine. • Emissions of NOx shall be no greater than 2 grams/bhp-hr from each of the 814 bhp and 1148 bhp lean burn engines. Emissions of NO_x shall be no greater than 1 grams/bhp-hr from the 1350 bhp lean burn engine. • Permittee shall ensure that 10 percent or more of the gross heat input to the affected emission units on an annual basis shall be from the combustion of landfill gas. In addition, the permittee shall operate the affected emission units in a manner that reasonably minimizes HAP emissions.	N
DAQE-AN0121175-06	Emergency Generators	• FLEX Pre-Approved BACT Determination for emergency generators: ○ The permittee shall not exceed 8,670 combined hours of maintenance-related operations per rolling 12-month period for all the limited use power supply units combined. No single limited use power supply unit shall exceed 500 hours of maintenance-related operation per rolling 12-month period unless otherwise specified. ○ Visible emissions from diesel-fired limited use power supply units shall be no greater than 20 percent opacity except for a period not exceeding 3 minutes in any hour. ○ *Comply with NSPS IIII and NESHAP ZZZZ, as applicable.* ○ *The permittee shall operate and maintain affected emission units that achieve the emission standards as required in 40 CFR 60.4205 over the entire life of the engine. The permittee shall do all of the following, except as permitted in II.B.42.a.1(b): (1) Operate and maintain the stationary CI ICE and control device according to the manufacturer's emission-related written instructions; (2) Change only those emission-related settings that are permitted by the manufacturer; and (3) Meet the requirements of 40 CFR parts 89, 94 and/or 1068, as applicable.* ○ *Fuel used shall meet the following per gallon standards of 40 CFR 80.510(b) for nonroad diesel fuel: 1. Sulfur content no greater than 15 ppm (0.0015 percent) by weight and 2. A minimum cetane index of 40 or a maximum aromatic content of 35 volume percent* ○ *Engine shall comply with the emission standards for new non-emergency CI ICE in 40 CFR 60.4201 for their 2007 model year and later stationary CI ICE, as applicable.*	Y

Table 5-1. Hill AFB Approval Orders and BACT Determination

Approval Order #	Project Description	BACT Determination *(Italicized BACT Conditions are from Title V Operating Permit #1100007003)*	Incorporates Flexibility Provisions
		○ *Each emergency affected emission unit shall not exceed 100 hours of maintenance checks and readiness testing per year unless the permittee maintains records indicating that Federal, State, or local standards require maintenance and testing of affected emission units beyond 100 hours per year. There is no time limit on the use of emergency stationary ICE in emergency situations. Emergency engines may operate up to 50 hours per year in non-emergency situations, but those 50 hours are counted towards the 100 hours per year provided for maintenance and testing. The 50 hours per year for non-emergency situations cannot be used for peak shaving or to generate income for a facility to supply power to an electric grid or otherwise supply non-emergency power as part of a financial arrangement with another entity. Any operation other than emergency operation, maintenance and testing, and operation in non-emergency situations for 50 hours per year, as permitted in 40 CFR 60.4211(f), is prohibited.* ○ *Engine shall comply with the emission standards for new emergency CI ICE in 40 CFR 60.4202 for their 2007 model year and later stationary CI ICE, as applicable.*	
DAQE-AN0121167-04	Abrasive Blasting	• The throughput of media shall not exceed 2,350 tons per rolling 12-month period from externally vented abrasive cleaning and non-chemical depainting equipment. • FLEX Pre-Approved BACT Determination for abrasive blasting not subject to the Aerospace NESHAP: ○ Visible emissions shall be no greater than 10 percent opacity from any point or fugitive source associated with non-NESHAP abrasive blasting operations. ○ *(a) All non-NESHAP abrasive blasting operations shall comply with at least one of the following performance standards: (1) Confined blasting; (2) Wet abrasive blasting; (3) Hydroblasting; or (4) Unconfined blasting using abrasives as defined in paragraph (b).* ○ *(b) Abrasives used for dry unconfined blasting referenced in paragraph (a)(4) above shall comply with the following performance standards: (1) Before blasting the abrasive shall not contain more than 1% by weight material passing a #70 U.S. Standard sieve. (2) After blasting the abrasive shall not contain more than 1.8% by weight material 5 micron or smaller. (3) Abrasives reused for dry unconfined blasting are exempt from paragraph (b)(2), but must conform with paragraph (b)(1).* ○ *(c) If using the performance standard of paragraph (a)(4), the permittee must demonstrate that the abrasives were obtained from persons that have certified (submitted test results) to the Director at least annually that such abrasives meet the requirements of paragraph (b) above*	Y

Table 5-1. Hill AFB Approval Orders and BACT Determination

Approval Order #	Project Description	BACT Determination *(Italicized BACT Conditions are from Title V Operating Permit #1100007003)*	Incorporates Flexibility Provisions
DAQE-AN0121162-04	Building 1701 Bake Oven	• Natural gas consumption shall be no greater than 2.2 MMSCF per rolling 12-month period.	N
DAQE-AN0121160-04	Carbon Brake Facility	• Visible emissions shall be no greater than 10 percent opacity. • The permittee shall not consume more than 80 gallons of P-13 (in the process tank) per rolling 12-month period.	N
DAQE-AN0121159-04	Building 507 Plasma Cutting Booth and Dust Collector	• Visible emissions shall be no greater than 10 percent opacity.	N
DAQE-1098-97	Building 849 Dust Collector	• Visible emissions shall be no greater than 10 percent opacity.	N
DAQE-353-88	Building 2013 Cold Solvent Tanks * *A request was submitted to UDAQ to rescind this AO. Due to 2014 rule changes, the units are subject to the consolidated degreaser AO.*	• A cover shall be installed on each tank. The covers shall remain closed except during actual periods of operation of the tanks. • An internal draining rack for cleaned parts shall be installed in both tanks. The parts shall be drained until all dripping ceases. • Waste or used solvent shall be stored in covered containers and disposed of by a method which prevents its emission to the atmosphere. • Tanks, containers, and all associated equipment shall be maintained in good operating condition and leaks shall be repaired immediately. • Written procedures for the operation and maintenance of the solvent cleaning equipment shall be posted in an accessible and conspicuous location near the equipment. • The cleaning solvent used shall be isopropyl alcohol.	N

Notes:
The following BACT condition applies to all emission units. "At all times, including periods of startup, shutdown, and malfunction, to the extent practicable, all equipment must be maintained and operated, including associated air pollution control equipment, in a manner consistent with good air pollution control practice for minimizing emissions."

SECTION 6

References

California Air Resources Board, *Proposed Amendments to The Airborne Toxic Control Measure for Stationary Compression Ignition Engines*, Appendix B: Analysis of the Technical Feasibility and Costs of After-Treatment Controls on New Emergency Standby Engines. 2010.

South Coast Air Quality Management District. *Best Available Control Technology Guidelines, Part A: Policy and Procedures for Major Polluting Facilities*. 2016.

United States Environmental Protection Agency (EPA). *Alternative Control Techniques Document – NO_x Emissions from Industrial/Commercial/Institutional (ICI) Boilers*. EPA-453/R-94-022. 1994.

United States Environmental Protection Agency (EPA). *New Source Review Workshop Manual: Prevention of Significant Deterioration and Nonattainment Permitting*. 1990.

United States Environmental Protection Agency (EPA). *Air Pollution Control Technology Fact Sheet*. EPA-452/F-03-032. 2003.

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